OHIO RIVER BASIN
TRIBUTARY TO LITTLE PLUM CREEK
ALLEGHENY COUNTY

PENNSYLVANIA

NDI No. PA 00838
PENN DER No. 2-50

RENTON SLURRY POND 3

CONSOLIDATION COAL COMPANY
EASTERN REGION

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DACW31-81-C-0027

PREPARED FOR

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
BALTIMORE, MARYLAND 21203

BY

ACKENHEIL & ASSOCIATES GEO SYSTEMS, INC.
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JULY 1981

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NDI NO. PA 00838
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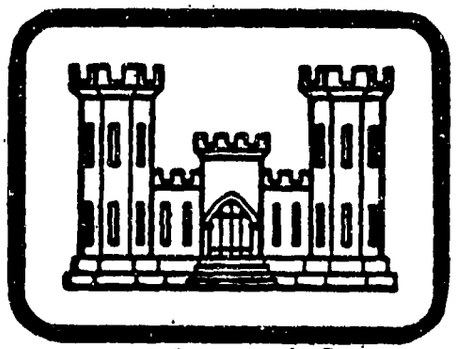

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Prepared for: DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

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Date: July 1981

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigations and analyses involving topographic mapping, subsurface investigations, materials testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify the need for such studies which should be performed by the owner.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some time in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" (PMF) for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS

NAME OF DAM:	Renton Slurry Pond 3
STATE LOCATION:	Pennsylvania
COUNTY LOCATION:	Allegheny
STREAM:	Unnamed tributary to Little Plum Creek.
DATE OF INSPECTION:	6 May 1981 and 17 June 1981
COORDINATES:	Lat. 40°29'59" Long. 79°43'10"

ASSESSMENT

Based on a review of available information, visual observations of conditions as they existed on the date of the field inspections, and supporting engineering caculations, the general condition of the Pond 3 is considered to be fair.

This assessment is based primarily on visual observations of embankment, spillway and seepage conditions and hydrology/ hydraulic analyses of reservoir/spillway capacity.

The structure is classified as a "small" size, "high" hazard dam. Corps of Engineers guidelines recommend 0.5 to one times the Probable Maximum Flood (PMF) as the Spillway Design Flood for a "small" size, "high" hazard dam. The Pond 3's Spillway Design Flood is the Probable Maximum Flood because of its height. Spillway capacity is "inadequate" because the non-overtopping flood discharge was found, by using the HEC-1 computer program, to be 35 percent of the PMF. At 0.5 PMF, the embankment overtopping depth and duration would be 0.58 feet and eight hours and 40 minutes respectively. In the opinion of the evaluating engineer, this overtopping depth and duration would not cause a catastrophic failure of the embankment.

The Phase I investigation revealed several deficiencies and conditions which should be corrected or improved through implementation of the following recommended monitoring and improvement efforts.

RECOMMENDATIONS

1. Embankment Improvements: The owner should immediately develop and implement a plan for improving surface drainage and providing erosion control for the Renton Slurry Pond 3 embankment and groins.

(2) Spillway Improvements: The owner should improve the reservoir/spillway system to accommodate and/or safely pass the appropriate Spillway Design Flood. This work should be performed under the direction of a knowledgeable Registered Professional Engineer.

The owner should also design and construct an improved channel for spillway discharge flows to protect the left groin and abutment from erosion.

A debris control structure should be installed on the inlet to the principal spillway conduit. The structure should be capable of retaining a considerable amount of debris while still permitting the spillway to operate without a rise in the pool level.

(3) Monitoring of Seepage Zones: The seepage zones should be monitored at frequent intervals for changes in water quality and quantity. If one does not now exist, the owner should develop and implement a regularly scheduled monitoring program with appropriate records to indicate possible long-term changes in seepage conditions.

(4) Emergency Operation and Warning Plan: The owner should develop an Emergency Operation and Warning Plan including:

a. Guidelines for evaluating inflow during periods of heavy precipitation or runoff.

b. Procedures for around-the-clock surveillance during periods of heavy precipitation or runoff.

c. Procedures for removal of standing water in the reservoir under emergency conditions.

d. Procedures for notifying downstream residents and public officials, in case evacuation of downstream areas is necessary.

(5) Maintenance and Inspection Procedures: The owner should develop written maintenance and inspection procedures in the form of checklists and step-by-step instructions.

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS (CONT'D)
Renton Slurry Pond 3

Samuel G. Mazzella — 17 July 1981
Samuel G. Mazzella — Date
Project Engineer

James P. Hannan — 17 July 1981
James P. Hannan — Date
Project Engineer

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
James Ellsworth Barrick, II
No. 22639-E

James E. Barrick — 17 July 1981
James E. Barrick, P.E. — Date
PA Registration No. 022639-E

Approved by: James W. Peck
JAMES W. PECK
Colonel, Corps of Engineers
Commander and District Engineer

11 Aug 81
Date

RENTON SLURRY POND 3

OVERVIEW

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SECTION 1
PROJECT INFORMATION

1.1 GENERAL

a. Authority: The Phase I investigation was performed pursuant to authority granted by Public Law 92-367 (National Dam Inspection Act) to the Secretary of the Army, through the Corps of Engineers, to conduct inspections of dams throughout the United States.

b. Purpose: The purpose of the investigation is to make a determination on whether or not the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

a. Dam and Appurtenances:

(1) Embankment: Renton Slurry Pond 3 was reportedly constructed of coarse coal refuse. An earthen dike has recently been added to the embankment's crest.

The pond embankment is about 910 feet long with a toe to crest height of 37.7 feet. The embankment's upstream slope is about 1.7H:1V above the water level. The downstream slope, at the deepest section, was measured to vary from 1.6H:1V to 2.3H:1V.

(2) Principal Spillway: The principal spillway is an 18 inch CMP embedded in the earthen dike at approximate Elevation 1240. Spillway discharge is to the left abutment and groin.

(3) Downstream Conditions: Discharge from the spillway and over the embankment's crest would flow directly to the Renton Mine and Preparation Plant which is located on the Little Plum Creek floodplain below. Little Plum Creek flows for about 5 miles to its confluence with Plum Creek at Unity, Pennsylvania. Plum Creek flows for about 6 miles to the Allegheny River at Verona, Pennsylvania.

(4) Watershed: The watershed contributing to Pond 3 is mostly barren fine and coarse coal refuse deposits. The impoundment zone comprises approximately one-third of the watershed.

Renton Slurry Pond 4 is located just upstream of Pond 3. The Pond 4 dike comprises the reservoir slope and shoreline for most of Pond 3's western perimeter. Pond 4 is almost full of fine coal refuse, although portions of the pond are still actively used for hydraulic placement of fine refuse.

b. Location: Pond 3 is located off stream of Little Plum Creek in Plum Borough, Allegheny County, Pennsylvania, approximately 1/2 mile east of Renton, Pennsylvania.

c. Size Classification: The impounding embankment has a maximum toe to crest height of 37.7 feet. The maximum storage capacity impounded is 224 acre-feet. Based on this data, the Renton Slurry Pond 3 is classified as a "small" size structure.

d. Hazard Classification: Renton Slurry Pond 3 is classified as a "high" hazard dam. In the event of a dam failure, a coal mine portal, load out facility, and coal preparation plant, State Route 28, and Conrail railroad tracks could be subjected to substantial damage and loss of more than a few lives could result.

e. Ownership: Pond 3 is owned by the Consolidation Coal Company, Eastern Region, Washington, Pennsylvania. Inquiries concerning the dam should be addressed to:

Consolidation Coal Company
Eastern Region
450 Racetrack Road
Washington, PA 15301
Attention: Mr. Marshall Hunt, Divisional Manager of Engineering and Environmental Quality Control
(412) 746-3400

f. Purpose of Dam: Renton Slurry Pond 3 impoundment was constructed as a storage facility for fine coal refuse produced at the Renton Mine and Preparation Plant.

g. Design and Construction History: There was no information concerning the design of this structure. The embankment was reportedly constructed by Consolidation Coal Company personnel using coarse coal refuse produced at the preparation plant.

h. Normal Operating Procedure: Renton Pond 3 was designed to operate as an uncontrolled structure. Under normal operating conditions, fine coal refuse slurry is pumped from the preparation plant and is discharged to the upstream end of the impoundment. The pool level is maintained by the principal spillway.

1.3 PERTINENT DATA

a. Drainage Area — 0.06 sq. mi.

b. Discharge

Maximum Flood at Dam Facility	Unknown
Principal Spillway Capacity at Top of Embankment	6 cfs

c. Elevation (feet above MSL)

Design Top of Embankment	Unknown
Current Top of Embankment (low point)	1243.0
Principal Spillway Inlet Invert*	1240.0*
Pool on Date of Inspection	1239.2
Principal Spillway Outlet Invert	1238.7
Downstream Toe of Embankment	1205.3

d. Reservoir Length

Maximum Pool	700 feet
Normal Pool	660 feet
Pool at Time of Inspection	650 feet

e. Reservoir Storage

Current Top of Embankment	224 acre-feet
Normal Pool	205 acre-feet

f. Reservoir Surface

Current Top of Embankment	6.0 acres
Normal Pool	5.5 acres

g. Embankment

Type	Earth and Coarse Coal Refuse
Length	910 feet
Height	37.7 feet
Crest Width	Varies from 10 to 20 feet
Slopes	
Downstream	1.6H:1V to 2.3H:1V
Upstream	1.7H:1V
Impervious Core	Unknown
Grout Curtain	Unknown

*Datum for field measurements as per PennDER records and USGS topographic mapping.

h. Principal (and Emergency) Spillway (Regulating Outlet)

Type	18 inch Diameter Corrugated Metal Pipe
Location	Through Embankment
Length	38 feet

i. Emergency Spillway

Type	None

j. Outlet Works

Type	None

SECTION 2
ENGINEERING DATA

2.1 DESIGN

a. Design History: There is no information available about the design of this structure.

b. Data Available: Data available for review included:

(1) The contents of PennDER files consisting of dam location information and a National Dam Inventory form.

(2) Discussions with a company representative during and after the field inspection on 6 May 1981.

2.2 CONSTRUCTION

a. Constructors: The dam was constructed by Consolidation Coal Company personnel. Construction dates are unknown.

b. Modification: There are no reported modifications to the structure after its completion. However, the field inspection revealed the recent placement of an earthen dike at the crest of the impounding embankment. The dike has raised the crest elevation approximately five feet and has increased the impoundment capacity.

2.3 OPERATION

a. Dam: The dam was designed to operate without a dam tender and no operational data is available.

b. Principal (and Emergency) Spillway: The principal (and emergency) spillway consists of an 18 inch diameter corrugated metal pipe (CMP) embedded in the earthen dike. The inlet is uncontrolled.

c. Outlet Works: No outlet works or pond drain was observed at this facility.

2.4 EVALUATION

a. Availability: Available information was obtained from the Pennsylvania Department of Environmental Resources and was supplemented by conversations with a representative of Consolidation Coal Company, the Owner.

b. Adequacy: The available design information, supplemented by field inspections and engineering analyses presented in succeeding sections, is adequate for the purpose of this Phase I Inspection Report.

c. Validity: There appears to be no reason to question the validity of the very limited available engineering information.

SECTION 3
VISUAL INSPECTION

3.1 FINDINGS

a. General: The field inspection of Renton Slurry Pond 3 was performed on 6 May 1981 and 17 June 1981 and consisted of:

(1) Visual observations of the embankment crest and slopes, groins and abutments;

(2) Visual observations of the principal (and emergency) spillway;

(3) Visual observations of the embankment's downstream toe area, including drainage channels and surficial conditions;

(4) Transit stadia field measurements of relative elevations along the embankment crest and across the embankment slopes;

(5) Visual observations of the reservoir shoreline and watershed;

(6) Visual observations of downstream conditions and evaluation of downstream hazard potential.

The visual observations and measurements were made during periods when the reservoir was about one foot below normal operating level. The field measurements were made on 6 May 1981 and most of the visual observations were made on 17 June 1981.

The visual observations checklist, field sketch, field profile and field section containing the observations and comments of the field inspection team are contained in Appendix A. Specific observations are illustrated on photographs in Appendix C. Detailed findings of the field inspection are presented in the following sections:

b. Embankment:

(1) Crest: The crest appeared to have been raised recently by the addition of an earthen dike. The crest was generally level with the low point occurring near the left abutment. The width varied between 10 and 20 feet and only a very few, small low spots were observed that could pond water. The crest was entirely unvegetated and contained minor drying cracks and a few minor tensional cracks near the junctions with the upstream and downstream slopes.

(2) Upstream Slope: The upstream face of the embankment was generally uniform from crest to shoreline and from abutment to abutment. The upstream slope was completely barren and contained some minor erosion, particularly at the waterline. Although the upstream slope was reasonably steep, there were no indications of significant slope instability. Minor tensional cracks were observed at the junction of the upstream slope and the crest.

(3) Downstream Slope: The downstream slope of the embankment appeared to be in good condition. The upper portion consists of the recently placed dike materials that ranged from barren to partially vegetated. Some minor erosion of these materials was observed. This portion of the downstream slope was relatively steep, but there were no indications of significant slope instability such as bulges, scarps or deep cracks. Minor tensional cracks were noted at a few locations at the junction of the crest and slope.

The lower portion of the downstream slope was also generally uniform from top to bottom and from abutment to abutment. This portion of the embankment is covered with a dense growth of vegetation, including grasses, weeds and crown vetch. Close inspection was impossible due to the dense vegetal growth, but there were no indications of slope movements or deformations. No seeping water or erosional gullies were observed on this portion of the downstream slope.

(4) Seepage: Two seepage zones were observed immediately below the downstream toe of the embankment. The larger of the two zones was located approximately 25 feet from the embankment's toe on the left abutment. Several small spring sources were observed, the largest of which was discharging less than 1/2 gallon per minute. Cattails and other water related vegetation were growing within the limits of the zone and discharge at the lower end of the seepage zone was estimated to be 1/2 to 1 gallon per minute. No fine soil sediments or discolored flows were observed that would indicate piping or movement of foundation soils.

The second seepage zone was somewhat smaller than the first but was located immediately adjacent to the embankment's downstream toe at approximately the embankment's deepest section. This seepage zone was characterized more by soft soils than by water related vegetation. No spring sources were identified but surface flow from the area was estimated at 1/2 to 1 gallon per minute.

(5) Embankment Groins: The embankment's left groin was generally overgrown by dense grass and crown vetch and could not be closely observed for seepage. Some soft soils were noted in this area but they appeared to be the result

of poor surface drainage. Vegetation in the immediate area did not indicate continuously wet conditions. No erosional gullies were observed anywhere along the left groin.

The embankment's right groin consists of a surface drainage ditch that parallels the haul road that forms the right abutment. The drainage ditch has been eroded into the coarse coal refuse materials that comprise the general right abutment area. Channel depths ranged from 18 to 24 inches and the bottom and side slopes were dry on the date of inspection.

c. Abutments:

(1) Left: The left abutment consists of a natural hillside with mild to moderately steep slopes. The hillside is generally vegetated with grasses, weeds, crown vetch and small trees. There were no signs of erosion or slope instability anywhere on the left abutment.

A seepage zone on the left abutment was previously described.

(2) Right: The right abutment consists of a massive deposit of both coarse and fine coal refuse materials. In general, these materials are unvegetated and have suffered some erosion due to surface runoff. However, there were no signs of significant erosional distress and there were no signs of slope instability that might threaten the Pond 3 impounding embankment.

d. Principal (and Emergency) Spillway: The Pond 3 spillway consists of an 18 inch diameter corrugated metal pipe embedded into the recently placed earthen dike atop the older impounding embankment.

The pipe projects from both the upstream and downstream slopes and on the date of inspection, was clear of debris that would hinder spillway discharge.

Downstream, the pipe projects beyond the toe of the recently placed earth fill materials and discharge from the pipe is directed onto numerous boulders that have been placed on the lower slope to protect against erosion.

Flows below the boulders will be onto the left abutment and along the left groin of the embankment for a distance of approximately 200 feet where flows would enter the surface drainage ditch along the haul road below the toe of the embankment.

e. Reservoir:

(1) Slopes: The reservoir slopes immediately above the Pond 3 shoreline consist almost entirely of coarse coal refuse materials that range from barren to partially vegetated. The slopes have suffered some erosion due to surface runoff.

The reservoir shoreline to the west consists of a coarse refuse dike behind which fine coal refuse has been impounded. This area is known as Renton Slurry Pond 4, and on the date of inspection, appeared to be full and capable of impounding only a limited amount of free water.

(2) Inlet Stream: There is no defined inlet stream to Renton Slurry Pond 3.

(3) Watershed: The watershed of Pond 3 consists primarily of Pond 4, which is generally filled with fine coal refuse materials. Some upland area drains to Pond 4.

On the date of inspection, the upper portion of Pond 4 had been diked off and fine coal refuse slurry was being deposited hydraulically into a small ponded area. The capacity of the diked area appeared to be quite limited and overtopping would result in a limited inflow to Pond 3.

(4) Sedimentation: Pond 3 contains a significant deposit of fine coal refuse that has been hydraulically placed by pumping from the Renton Mine and Preparation Plant in the valley below. The slurry is discharged to the upper end of the pond from a four inch diameter plastic pipe.

Some sedimentation has occurred due to erosion of reservoir slopes but this condition is not significant.

f. Downstream Conditions:

(1) Downstream Channel: Spillway flows and embankment overtopping flows would be directed onto the haul road that passes along the right side of the embankment. The haul road proceeds downhill for approximately 2,000 feet to the Renton Mine and Preparation Plant below. The plant lies on the floodplain of Little Plum Creek.

(2) Floodplain Conditions: No inhabited dwellings lie on the floodplain in the first 7,000 feet below Pond 3, but the Renton Mine and Preparation Plant are occupied continuously by mine personnel.

3.2 EVALUATION

The following evaluations are based on the visual inspections performed on 6 May 1981 and 17 June 1981:

a. Embankment: The condition of the Renton Slurry Pond 3 impounding embankment was fair. Deficiencies were observed which included:

(1) An unvegetated crest, upstream slope and portions of the downstream slope;

(2) Minor erosion of unvegetated portions of the dam, including minor wave erosion at the shoreline;

(3) Minor tensional cracking at the junctions of the crest and upstream and downstream slopes;

(4) Erosion of coarse coal refuse materials along the embankment's right groin.

(5) Relatively steep slopes on the recently placed earthen dike portion of the impounding embankment.

b. Principal (and Emergency) Spillway: The spillway is considered to be deficient because there is no defined or erosionally stable discharge channel below the pipe outlet. The pipe inlet has no debris control structure.

c. Seepage: The two seepage zones observed below the embankment's downstream toe represent potential threats to the impoundment even though, on the date of inspection, there were no indications of adverse conditions.

d. Hazard Potential: Renton Slurry Pond 3 was assigned a "high" hazard potential rating. This rating is based on the observed height and impounding capacity of the pond and the downstream floodplain conditions, which include a large mine and coal preparation plant complex. Failure of the Pond 3 impounding embankment would result in significant disruption of industrial activities and the loss of more than a few lives could result.

SECTION 4
OPERATIONAL FEATURES

4.1 PROCEDURE

The only operational feature of Renton Slurry Pond 3 is the slurry inflow pipe. Fine coal refuse slurry is pumped from the Renton Mine and Coal Preparation Plant into the impoundment.

The principal (and emergency) spillway is an uncontrolled, 18 inch diameter CMP through the embankment near the left abutment.

No outlet works or pond drain was observed on the date of inspection.

4.2 MAINTENANCE OF DAM

The embankment and appurtenances are maintained by the Consolidation Coal Company. Maintenance reportedly consists of periodically repairing eroded and sloughed areas and making miscellaneous repairs as necessary.

4.3 INSPECTION OF DAM

The Consolidation Coal Company is required by the State of Pennsylvania to inspect the dam annually and make needed repairs.

The Consolidation Coal Company is required by the Mining Safety and Health Administration (MSHA) to inspect the dam at least once every seven days and to make an annual report and certification of the dam.

4.4 WARNING PROCEDURE

There is no warning system and no formal emergency procedure to alert or evacuate downstream inhabitants upon threat of a dam failure.

4.5 EVALUATION

Pond 3 does not have an outlet works to draw down the pool level in case of an emergency.

The maintenance program should be continued. However, there are no written operation, maintenance or inspection procedures, nor is there a warning system or formal emergency procedure for this dam. These procedures should be developed in the form of checklists and step by step instructions, and should be implemented as necessary.

SECTION 5
HYDROLOGY AND HYDRAULICS

5.1 EVALUATION OF FEATURES

a. Design Data: Renton Slurry Pond 3 has a watershed of about 38 acres which is unvegetated and consists mostly of coarse and fine coal refuse. The watershed is about 1,500 feet long and 1,500 feet wide and has a maximum elevation of about 1,300 feet (MSL).

Pool level is maintained by the invert of the principal (and emergency) spillway at about Elevation 1240.

There is no information available on the required spillway capacity at the time of this facility's construction.

No hydrologic calculations were found relating reservoir/spillway performance to the Probable Maximum Flood or fractions thereof.

b. Experience Data: Records are not kept of impoundment level or rainfall amounts. There is no record or report of the embankment ever being overtopped.

c. Visual Observations: On the date of the field inspection, the pool elevation was about 3.8 feet below the crest of the embankment.

No permanent outlet facilities were observed. The 18 inch diameter CMP spillway conduit appeared to be functional.

d. Overtopping Potential: Overtopping potential was investigated through the development of the Probable Maximum Flood (PMF) for the watershed and the subsequent routing of the PMF and fractions of the PMF through the reservoir. The Corps of Engineers guidelines recommend one half to one times the Probable Maximum Flood (PMF) for "small" size, "high" hazard dams. Based on the height and potential for downstream damage and loss of life, the Renton Slurry Pond 3 has a Spillway Design Flood (SDF) of the PMF.

Hydrometeorological Report No. 33 indicates the adjusted 24 hour Probable Maximum Precipitation (PMP) for the subject site is 19.2 inches. No calculations are available to indicate whether or not the reservoir/spillway system is sized to accommodate a flood corresponding to the runoff from 19.2 inches of rainfall in 24 hours. Consequently, an evaluation of the reservoir/spillway system was performed to determine whether or not the dam's spillway capacity is adequate under current Corps of Engineers guidelines.

The Corps of Engineers, Baltimore District, has directed that the HEC-1 Dam Safety Version computer program be utilized. The program was prepared by the Hydrologic Engineering Center (HEC), U.S. Army Corps of Engineers, Davis, California, July 1978. The major methodologies and key input data for this program are discussed briefly in Appendix D.

The peak inflow to the Renton Slurry Pond 3 was determined by HEC-1 to be 225 cfs for a full PMF.

An initial pool elevation of 1240.0 was assumed prior to commencement of the storm.

e. Spillway Adequacy: The capacity of the combined reservoir and spillway system was determined to be 35 percent of the PMF by HEC-1. According to Corps of Engineers' guidelines, Renton Slurry Pond 3's spillway is "inadequate".

The maximum dam overtopping depth for the 1/2 PMF was calculated by HEC-1 to be 0.58 foot. In the event of the occurrence of such a storm, overtopping would be limited to approximately 170 feet of the embankment crest near the left end of the dam. Duration of this overtopping would be approximately 8.7 hours. In the opinion of the evaluating engineer, this overtopping would probably cause a failure of the embankment. This is based on the computed flow depth and duration and observed soil conditions.

However, the embankment failure would occur at a section where the earthen dike height is approximately five feet or less. Such a failure could be expected to result in a limited flood discharge condition downstream since the hydraulic head causing the flood wave (breach depth) would be relatively small.

Consequently, the Renton Slurry Pond 3 spillway is "inadequate," but not "seriously inadequate."

SECTION 6
STRUCTURAL STABILITY

6.1 AVAILABLE INFORMATION

a. Design and Construction Data: No design documentation or calculations were available for review.

b. Operating Records: There are no written operating records or procedures for this dam.

c. Mining Activity: The Upper Freeport Coal Seam lies approximately 640 feet below the dam and impoundment and may have been deep mined. The Pittsburgh Coal Seam outcrops in the adjacent hillside and has been surface mined.

d. Visual Observations:

(1) Embankment: The field inspection disclosed no visible evidence of a high ground water level in the embankment. Two swampy zones were observed below the toe of the embankment that may be the result of foundation seepage. However, there was no indication of internal erosion (piping) of soil or refuse materials.

The embankment's slope ranged from moderate to steep. The upstream slope was measured to be 1.7H:1V and the downstream slope varied from 1.6H:1V near the crest to 2.3H:1V near the toe.

There were no observed indications of significant slope instability such as scarps or bulges. Several small tension cracks were observed near the crest in the recently placed earthen dike materials.

(2) Principal Spillway: The principal spillway was functional on the date of inspection.

Discharge from the spillway conduit is currently directed, in an uncontrolled manner, onto the left abutment and groin. No defined channel for this discharge was observed, which may lead to an erosional problem at the embankment's toe in the future.

(3) Evidence of Mine Subsidence: None.

e. Performance: There are no reports of problems with the performance of this embankment over its lifetime.

6.2 EVALUATION

a. Design Documents: No design documentation was available for review.

b. Embankment: Based on the results of visual observations of embankment slopes, materials and groundwater conditions, the embankment is considered to be stable.

However, the seepage conditions described above should be monitored as part of an overall surveillance program, as recommended in Section 7.

c. Principal (and Emergency) Spillway: Based on visual observations, the principal spillway appeared to be stable.

d. Seismic Stability: According to the Seismic Risk Map of the United States, Renton Slurry Pond 3 is located in Zone 1 where damage due to earthquake would most likely be minor.

A dam located in Seismic Zone 1 may be assumed to present no hazard from an earthquake provided static stability conditions are satisfactory and conventional safety margins exist.

However, no calculations were performed to verify this assumption.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS

7.1 ASSESSMENT

a. Evaluation:

(1) Embankment: Renton Slurry Pond 3's impounding embankment is considered to be in fair condition. This assessment is based primarily on visual observations of the earthen dike that revealed steep slopes and a lack of vegetation. Also, some erosion of the embankment's right groin has occurred.

(2) Principal (and Emergency) Spillway: The spillway is considered to be in poor condition. This assessment is based on observations that revealed no effective (erosionally stable) discharge channel and HEC-1 calculations that indicate that the spillway capacity is "inadequate" according to current Corps of Engineers' guidelines.

(3) Seepage Zones: Two seepage zones were observed below the embankment's downstream toe that may, in the future, pose a threat to the impoundment. On the date of the inspection, there were no indications of internal erosion (piping) of foundation materials.

(4) Emergency Plans: The lack of a documented emergency operation and warning plan is considered to be a deficiency.

b. Adequacy of Information: The information available on design, construction, operation and performance history in combination with visual observations and hydrology and hydraulic calculations was sufficient to evaluate the embankment and appurtenant structures in accordance with the Phase I investigation guidelines.

c. Urgency: The recommendations presented in Section 7 should be implemented immediately.

d. Necessity for Additional Studies: See 7.2b below.

7.2 RECOMMENDATIONS

a. Embankment Improvements: The owner should immediately develop and implement a plan for improving surface drainage and providing erosion control for the Renton Slurry Pond 3 embankment and groins.

b. Spillway Improvements: The owner should improve the reservoir/spillway system to accomodate and/or safely pass the appropriate Spillway Design Flood. This work should be performed under the direction of a knowledgeable Registered Professional Engineer.

The owner should also design and construct an improved channel for spillway discharge flows to protect the left groin and abutment from erosion.

A debris control structure should be installed on the inlet to the principal spillway conduit. The structure should be capable of retaining a considerable amount of debris while still permitting the spillway to operate without a rise in pool level.

c. Monitoring of Seepage Zones: The seepage zones should be monitored at frequent intervals for changes in water quality and quantity. If one does not now exist, the owner should develop and implement a regularly scheduled monitoring program with appropriate records to indicate possible long-term changes in seepage conditions.

d. Emergency Operation and Warning Plan: The owner should develop an Emergency Operation and Warning Plan including:

(1) Guidelines for evaluating inflow during periods of heavy precipitation or runoff.

(2) Procedures for around the clock surveillance during periods of heavy precipitation or runoff.

(3) Procedures for removal of standing water in the reservoir under emergency conditions.

(4) Procedures for notifying downstream residents and public officials, in case evacuation of downstream areas is necessary.

e. Maintenance and Inspection Procedures: The owner should develop written maintenance and inspection procedures in the form of checklists and step-by-step instructions.

APPENDIX A

VISUAL INSPECTION CHECKLIST

VISUAL OBSERVATIONS CHECKLIST I
(NON-MASONRY IMPOUNDING STRUCTURE)

Name of Dam Renton Slurry Pond 3 County Allegheny State Pennsylvania National ID # PA 00838

Type of Dam Earth and coarse coal refuse Hazard Category High

Dates of Inspection 6 May 1981 Weather Cloudy, light rain Temperature 45°F

17 June 1981 Weather Partly cloudy, warm Temperature 65°F

Pool Elevation at Time of Inspection 1239.2 (MSL)

Inspection Personnel: 6 May 1981

J. P. Hannan — Ackenheil & Associates, Geotechnical Engineer
S. G. Mazzella — Ackenheil & Associates, Civil Engineer

17 June 1981

J. E. Barrick, P.E. — Ackenheil & Associates, Project Manager and Hydrologist

Recorder J. E. Barrick

GEO Project G80138-J
PennDER I.D. No.2-50

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	Randomly oriented drying cracks observed on embankment crest. Cracks closed to very slight opening. Several minor tensional cracks were observed along the junction of the crest and the upstream and downstream slopes. All cracks appeared to be shallow and no scarps were observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Some minor erosion observed in barren earth materials of the earthen dike that appears to have been recently placed on the embankment's crest. Minor wave erosion observed at the shoreline around the entire perimeter of the pond. The erosion appears to be the result of a lack of vegetation on the recently placed dike. No significant erosion of either abutment was observed.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	The embankment crest, although generally level, contained a low area immediately adjacent to the left abutment. At the right end of the crest, the embankment rose slightly as it approached the adjacent haul road.	

EMBANKMENT (CONTINUED)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST (continued)	Horizontally, the embankment crest is curved, being convex downstream and having a central angle of approximately 150 degrees. The crest width varied from 10 to 20 feet.	
RIPRAP FAILURES	None observed.	
SETTLEMENT	None observed.	
JUNCTION OF EMBANKMENT AND ABUTMENT	The junction of the embankment and the left abutment was generally covered with a dense growth of vegetation consisting of weeds, grasses, and crown vetch. No significant erosional gullies were observed and no seepage was noted. A wet spot was observed just to the right of the left end of the embankment where it appeared that surface water has been trapped in a topographic low. There was no indication of a continuously wet condition. The junction of the embankment and the right abutment consisted of a surface drainage ditch along the haul road that parallels the right portion of the embankment and forms the right abutment. The drainage ditch was generally irregular, being the result of erosion caused by surface runoff. The ditch was approximately 18 to 24 inches deep and was dry on the date of inspection. There was no indication of seepage or anomalous moisture in or along the ditch.	

EMBANKMENT (CONTINUED)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	Two swampy zones were observed just below the downstream toe of the embankment near the central (or highest) portion of the dam. The larger zone was approximately 25 feet from the toe of the dam and contained several small springs, the largest of which appeared to be emitting a flow of less than 1/2 gallon per minute. Cattails and other swamp-type vegetation were growing. Surface flow from the seepage zone was estimated in the range of 1/2 to 1 gallon per minute. There was no indication of sediment or movement of soil or coal refuse particles. The second seepage zone was considerably smaller than the first but was located immediately adjacent to the downstream toe of the embankment, at the edge of the haul road. This zone was characterized more by soft soil conditions than by water related vegetation. The estimated surface flow from the area was 1/2 to 1 gallon per minute.	
STAFF GAUGE AND RECORDER	None observed.	
DRAINS	None observed.	
SURFICIAL CONDITIONS	The embankment crest was unvegetated. Only a few low spots were observed to be capable of ponding water. The crest was uneroded and in generally good condition.	

EMBANKMENT (CONTINUED)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFICIAL CONDITIONS (continued)	The embankment's upstream slope was relatively steep but uniform from crest to pond surface and from abutment to abutment. Some minor erosion of the barren slope has occurred and some erosion at the water line has occurred. But in general the slope was in good condition. A few minor tension cracks were observed at the junction with the crest. The embankment's downstream slope appeared to be in generally good condition. The upper portion of the slope (dike) was barren to partially vegetated and has suffered some minor erosion. The dike slope is moderately steep, but there were no signs of sloughing, bulging, or scarps that would indicate slope instability. Minor tension cracks were observed at the junction of the crest and the slope at a few locations. The lower (older) portion of the downstream slope was completely vegetated by a dense growth of grass, brush and crown vetch. The lower slope was somewhat flatter than the upper slope and was generally uniform vertically and horizontally. Although close observation was obscured by the dense vegetation, no bulges, scarps, or other indications of slope instability were observed. There were no indications of abrupt changes in vegetal type. No seeping water was observed anywhere on the downstream slope.	

PRINCIPAL (AND EMERGENCY) SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
INLET	The inlet to the spillway was clear of debris on the date of inspection.	
CONDUIT	The spillway conduit is an 18 inch diameter corrugated metal pipe that passes through the recently placed earthen dike. The conduit has a projecting inlet and projecting outlet. No significant deformations of the conduit were observed on the date of inspection.	
OUTLET	The outlet of the spillway conduit projects beyond the toe of the earthen dike and discharge is directly to a number of large boulders that have been placed to retard erosion of the lower slope.	
DISCHARGE CHANNEL	Discharge from the spillway conduit will flow across the lower left abutment and along the toe of the embankment for approximately 200 feet where it would enter the haul road drainage ditch.	
EMERGENCY GATE	None observed.	

INSTRUMENTATION

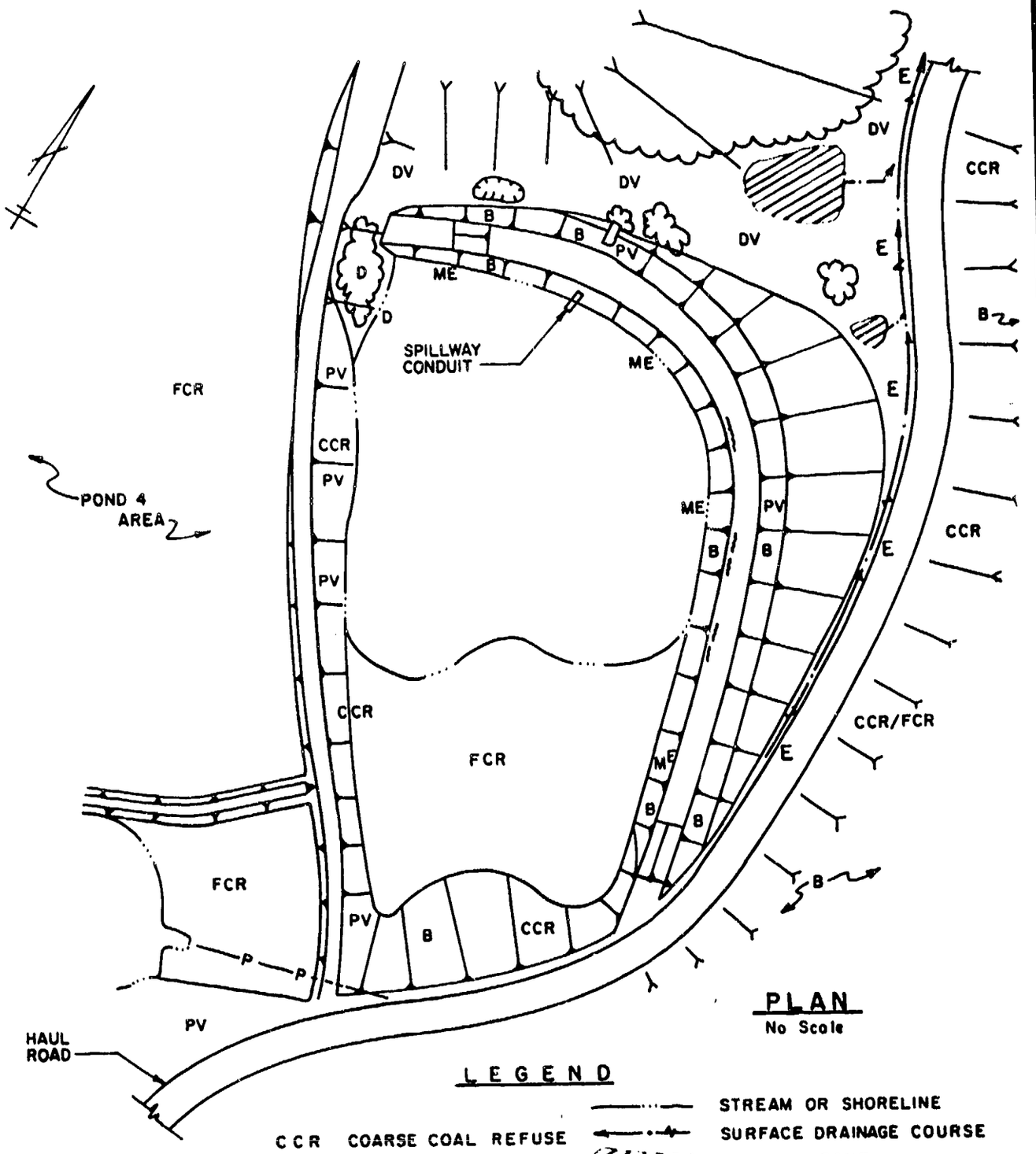
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None observed.	
WEIRS	None observed.	
PIEZOMETERS	None observed.	
OBSERVATION WELLS	None observed.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The reservoir slopes around the perimeter of the pond are relatively steep and consist primarily of coarse coal refuse materials. These slopes are partially vegetated and have suffered some erosion due to surface runoff. Sedimentation of eroded reservoir slopes does not appear to be a problem.	
SEDIMENTATION	Pond 3 contains a significant deposit of fine coal refuse that has been hydraulically placed by pumping from the Renton Mine and Preparation Plant in the valley below the impoundment. Sedimentation resulting from runoff across reservoir slopes is not significant.	
INLET STREAM	The reservoir has no inlet stream.	
WATERSHED	The watershed for the pond consists of coarse and fine coal refuse materials which are generally unvegetated. The major portion of the watershed consists of Renton Slurry Pond 4 which lies immediately to the west of Pond 3 and whose embankment comprises a major portion of the Pond 3 reservoir shoreline. Pond 4 is almost completely filled with fine coal refuse although, on the date of inspection, slurry was being discharged to a small diked area at the upper end of Pond 4. This diked portion of Pond 4 appeared to have only limited storage capacity and overtopping of the dike between Pond 4 and Pond 3 would probably not have a significant effect on the Pond 3 impounding embankment.	

DOWNSTREAM CONDITIONS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CHANNEL (OBSTRUCTIONS, DEBRIS, ETC.)	Principal (and emergency) spillway flows and embankment overtopping flows would be directed onto the haul road that forms the embankment's right abutment. The haul road leads directly to the Renton Mine and Preparation Plant approximately 2000 feet below with ultimate discharge to Little Plum Creek.	
APPROXIMATE NUMBER OF HOMES AND POPULATION	No inhabited dwellings lie along Little Plum Creek in the first 7,000 feet below Pond 3. The only inhabited facility in this reach is the Renton Mine and Coal Preparation Plant.	



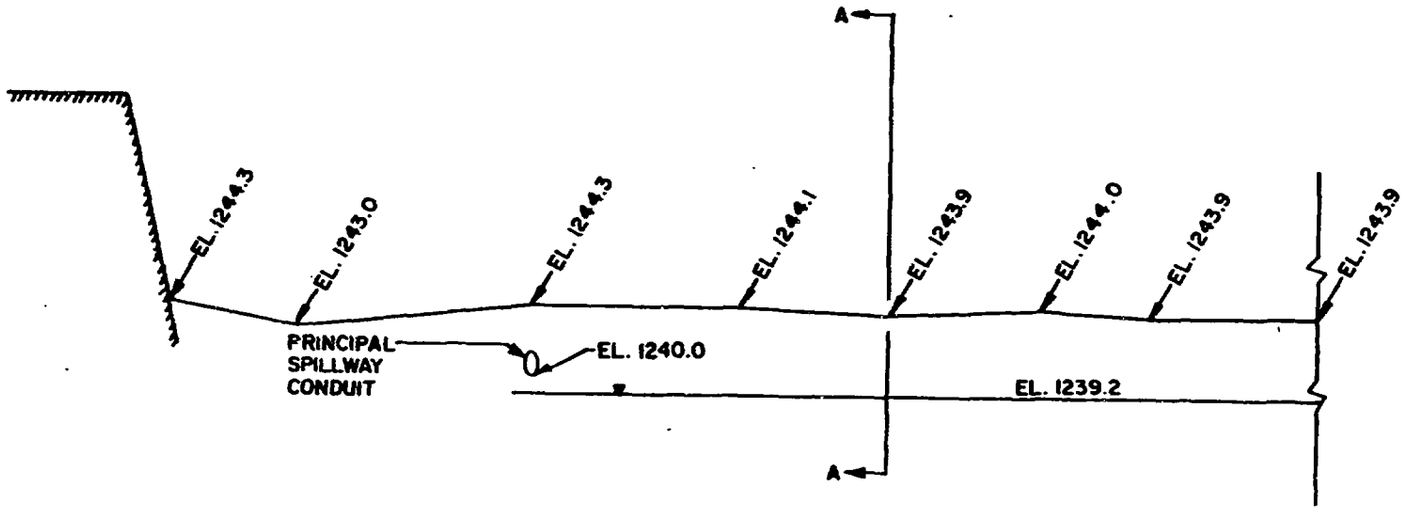
PLAN
No Scale

LEGEND

CCR	COARSE COAL REFUSE		STREAM OR SHORELINE
FCR	FINE COAL REFUSE		SURFACE DRAINAGE COURSE
B	BARREN		SEEPAGE ZONE
PV	PARTIALLY VEGETATED		TENSION CRACKS
DV	DENSELY VEGETATED		DEPRESSION
E	EROSION		WOODS
ME	MINOR EROSION	P	PIPELINE
	IMPOUNDING EMBANKMENT SLOPE	D	DUCKS
	OTHER SLOPES		

DATE: JULY 1981	RENTON SLURRY POND 3 NATIONAL DAM INSPECTION PROGRAM	FIELD SKETCH
SCALE: NONE		
DR: JF CK:	ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS GEO SYSTEMS, INC. 1000 BANKSVILLE RD./PITTSBURGH, PA. 15216	
DWG. NO. 80138 J-1		

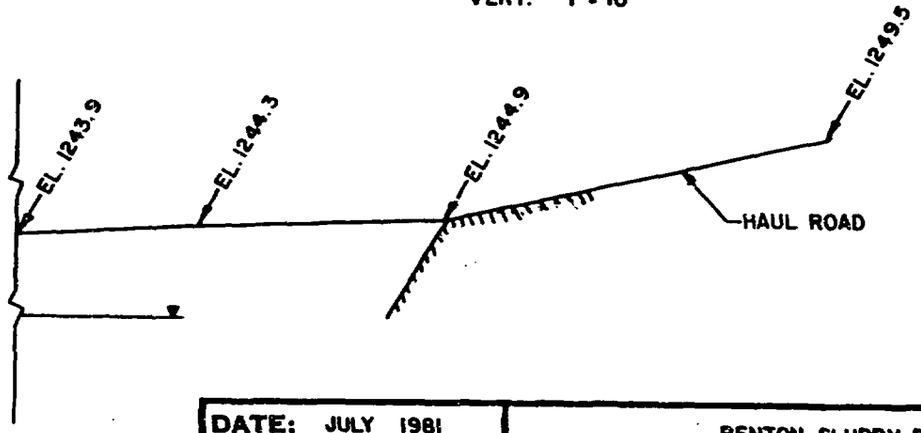
PR 8717-876



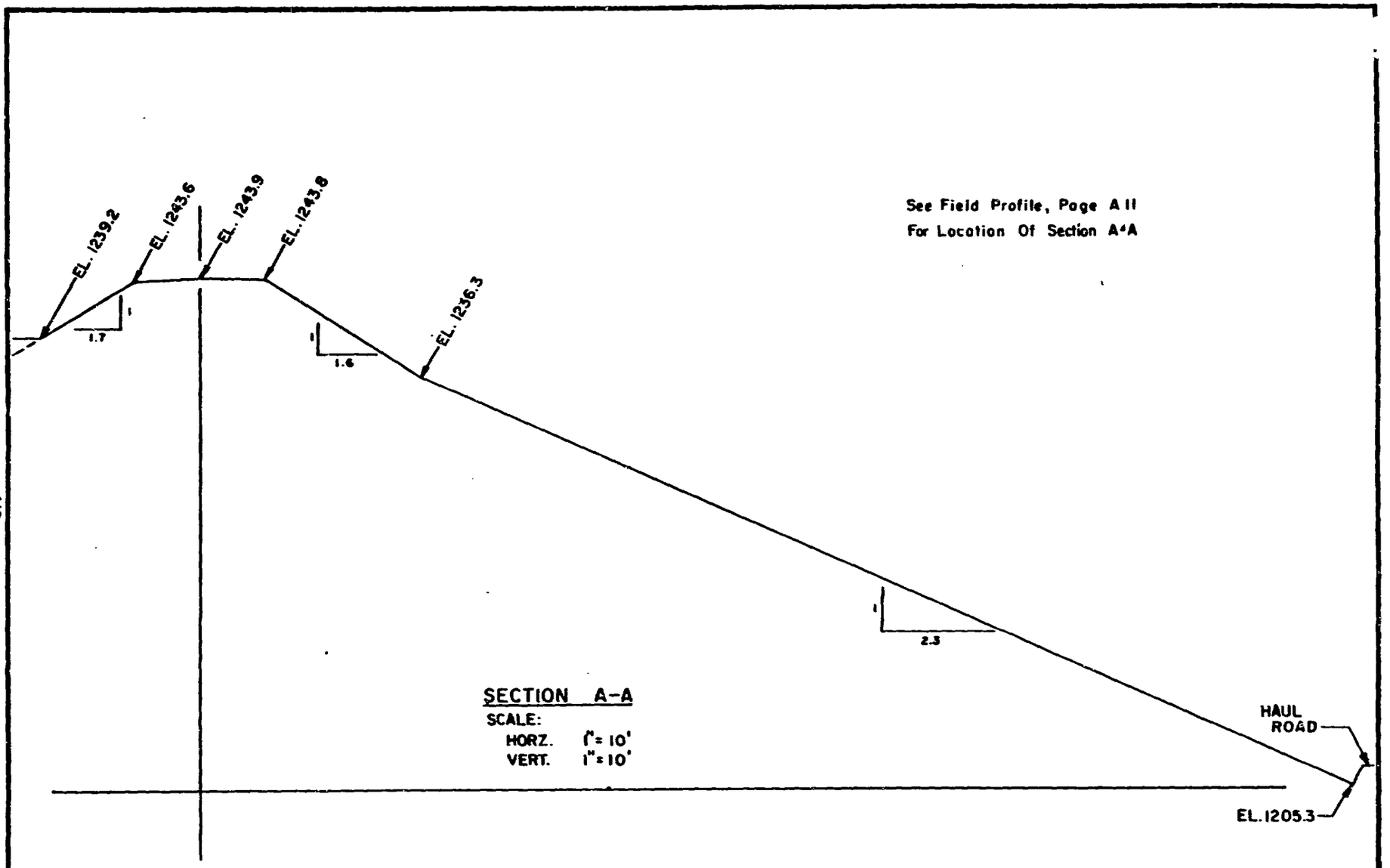
DAM PROFILE
(LOOKING DOWNSTREAM)

SCALE:
HORZ. 1"= 100'
VERT. 1"= 10'

See Field Section, Page A12
For Section A-A



DATE: JULY 1981	RENTON SLURRY POND 3 NATIONAL DAM INSPECTION PROGRAM	FIELD PROFILE
SCALE: AS SHOWN		
DR: JF CK: JEB	ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS GEO SYSTEMS, INC. 1000 BANKSVILLE RD./PITTSBURGH, PA. 15216	
DWG. NO. 80138J-2		



See Field Profile, Page A II
For Location Of Section A-A

SECTION A-A

SCALE:
HORZ. 1" = 10'
VERT. 1" = 10'

DATE: JULY 1981	RENTON SLURRY POND 3 NATIONAL DAM INSPECTION PROGRAM	FIELD SECTION
SCALE: AS SHOWN		
DR: JF CK: JEB	ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS GEO SYSTEMS, INC. 1000 BANKSVILLE RD./PITTSBURGH, PA. 15216	
DWG. NO. 80138 J-3		

APPENDIX B

ENGINEERING DATA CHECKLIST

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Renton Slurry Pond 3
NDI No. PA 00838

ITEM	REMARKS
Design Drawings	None available.
As-Built Drawings	None available.
Regional Vicinity Map	USGS 7-1/2 Minute New Kensington East and Murrysville, Pennsylvania Quadrangle Maps.
*Construction History	Constructed by Consolidated Coal Company personnel. Dates of construction unknown. Constructed of coarse coal refuse.
Typical Sections of Dam	None available.
Outlets-Plans Details Constraints Discharge Ratings	None available.
Rain/Reservoir Records	None available.
Design Reports	None available.
Geology Reports	None available.

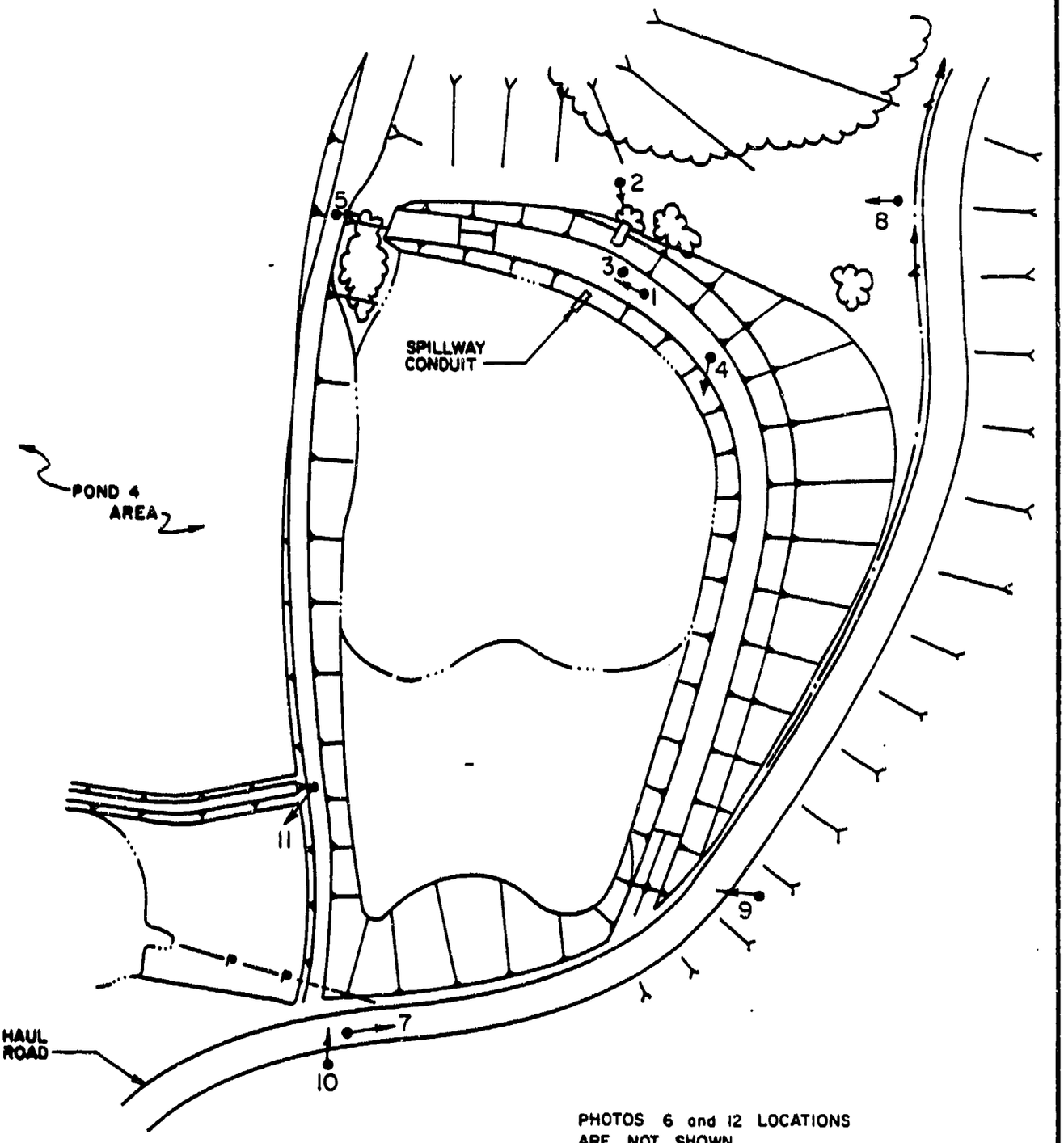
ITEM	REMARKS
Design Computations	None available.
Hydrology and Hydraulics	None available.
Dam Stability	None available.
Seepage Studies	None available.
Materials Investigations, Boring Records, Laboratory, Field	None available.
Post-Construction Surveys of Dam	None recorded.
Borrow Sources	Information not available.
Monitoring Systems	None reported.
Modifications	None reported.
High Pool Records	None available.

ITEM	REMARKS
Post-Construction Engineering Studies and Reports	Annual certification for MSHA Requirement 77.216-4 by Andrew J. Gorun, dated 22 April 1980.
Maintenance, Operation, Records	None available.
Spillway-Plan Sections Details	None available.
Operating Equipment Plans and Details	None available.
Specifications	None available.
Miscellaneous	None available.
Construction Reports	None available.
Prior Accidents or Failure of Dam Description Reports	None reported.

*Information supplied by owner.

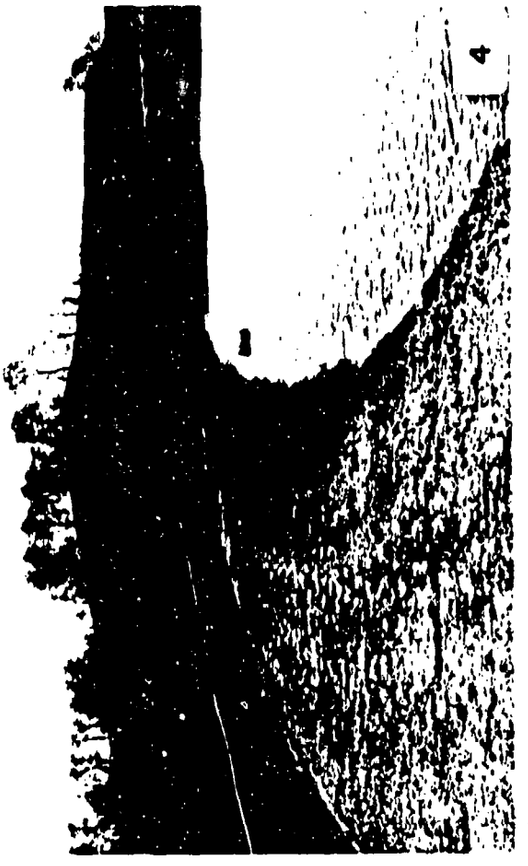
APPENDIX C

PHOTOGRAPHS

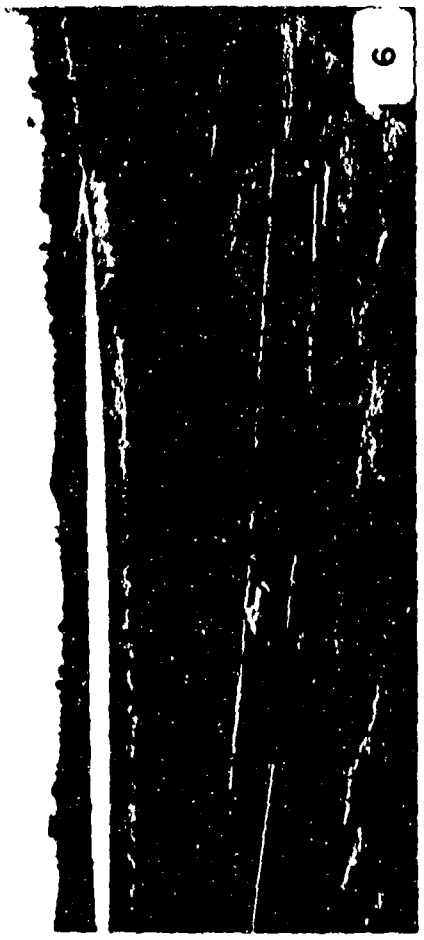


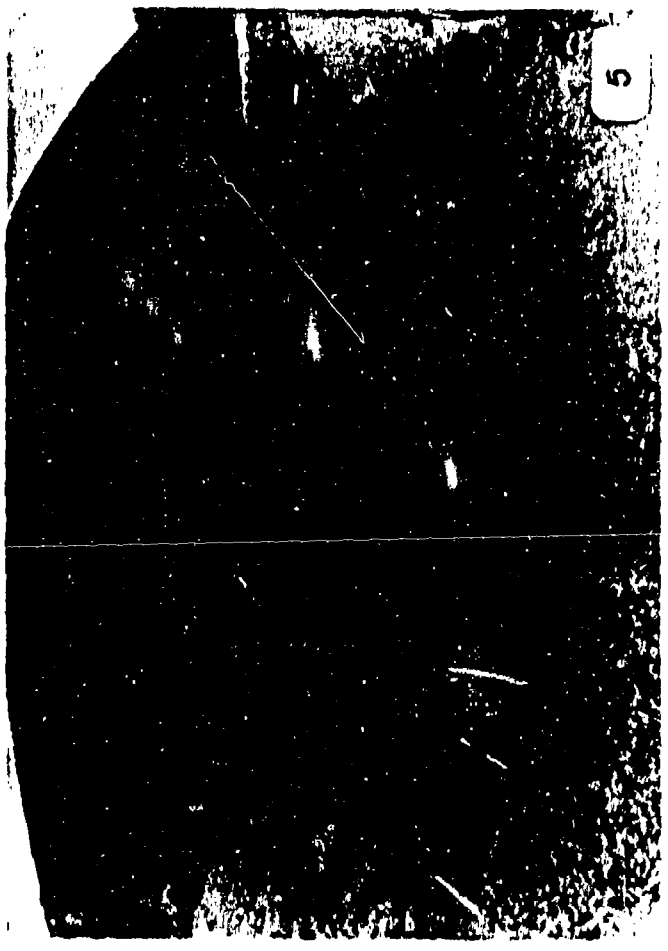
DATE: JULY 1981	RENTON SLURRY POND 3 NATIONAL DAM INSPECTION PROGRAM	PHOTO KEY MAP
SCALE: NONE		
DR: JF CK:	ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS GEO SYSTEMS, INC. 1000 BANKSVILLE RD./PITTSBURGH, PA. 15216	
DWG. NO. 80138 J		

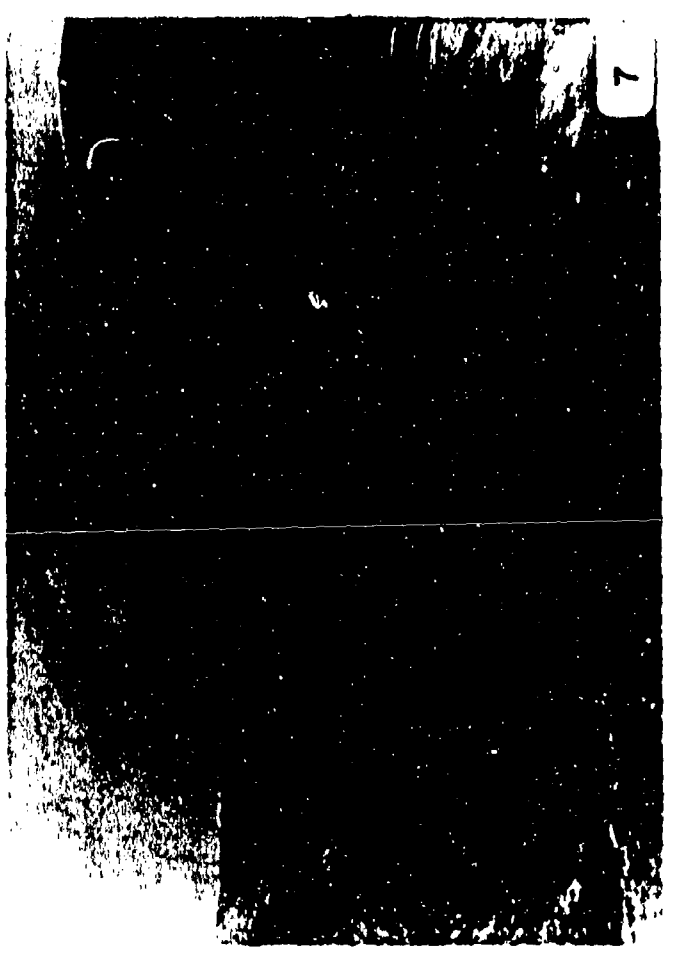
RENTON SLURRY POND 3



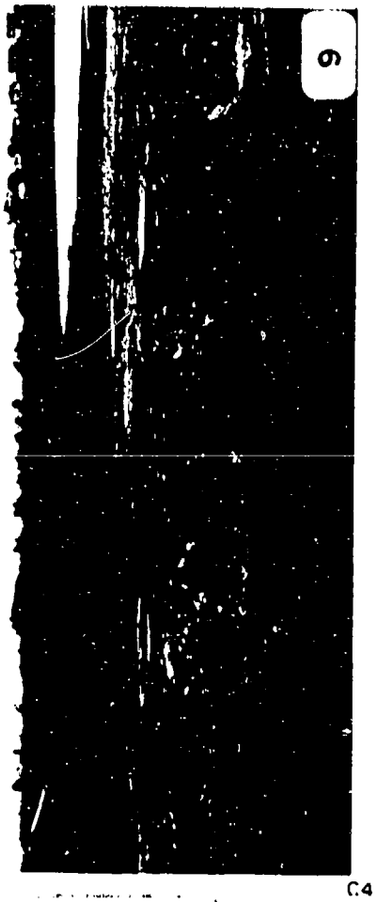
RENTON SLURRY POND 3

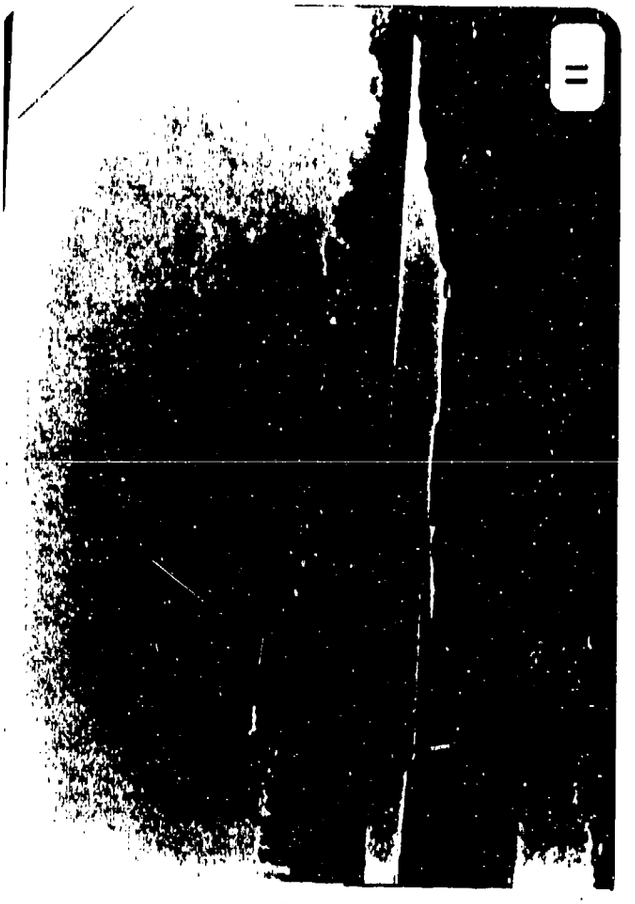






RENTON SLURRY POND 3





PHOTOGRAPH DESCRIPTIONS

Photo 1 Principal (and Emergency Spillway Conduit through left portion of embankment.

Photo 2 Conduit Discharge End.

Photo 3 Surface Cracks on embankment crest.

Photo 4 Embankment Crest, right portion.

Photo 5 Embankment Crest, left portion, taken from Pond 4.

Photo 6 Downstream Slope, overview from adjacent refuse pile on right abutment.

Photo 7 Haul Road, along right embankment groin.

Photo 8 Seepage, from seepage zone on left abutment.

Photo 9 Pond 4 Embankment, behind Pond 3.

Photo 10 Pond 4 Embankment crest.

Photo 11 Pond 4, Active slurry impoundment diked portion being used.

Photo 12 Downstream Hazard, Renton Mine and Preparation Plant.

APPENDIX D

HYDROLOGY AND HYDRAULICS ANALYSES

APPENDIX D
HYDROLOGY AND HYDRAULICS ANALYSES

Methodology: The dam overtopping analysis was accomplished using the systemized computer program HEC-1 (Dam Safety Version, July 1978,) prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. A brief description of the methodology used in the analysis is presented below.

1. Precipitation: The Probable Maximum Precipitation (PMP) is derived and determined from regional charts prepared from past rainfall records including "Hydrometeorological Report No. 33" prepared by the U.S. Weather Bureau.

The index rainfall is reduced from 10% to 20% depending on watershed size by utilization of what is termed the HOP Brook adjustment factor. Distribution of the total rainfall is made by the computer program using distribution methods developed by the Corps.

2. Inflow Hydrograph: The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for reservoir routing.

The unit hydrograph is developed using the Snyder method. This method requires calculation of several key parameters. The following list gives these parameters, their definition and how they were obtained for these analyses.

Parameter	Definition	Where Obtained
Ct	Coefficient representing variations of watershed	From Corps of Engineers*
L	Length of main stream channel	From USGS 7.5 minute topographic map
Lca	Length on main stream to centroid of watershed	From USGS 7.5 minute topographic map
Cp	Peaking coefficient	From Corps of Engineers*
A	Watershed size	From USGS 7.5 minute topographic map

3. Routing: Reservoir routing is accomplished by using Modified Puls routing techniques where the flood hydrograph is routed through reservoir storage. Hydraulic capacities of the spillway and the crest of the dam are used as outlet controls in the routing.

The hydraulic capacity of an outlet works can either be calculated and input or sufficient dimensions input and the program will calculate an elevation-discharge relationship.

Storage in the pool area is defined by an area-elevation relationship from which the computer calculates storage. Surface areas are either planimetered from available mapping or USGS 7.5 minute series topographic maps or taken from reasonably accurate design data.

4. Dam Overtopping: Using given percentages of the Probably Maximum Flood (PMF)**, the computer program will calculate the percentage of the PMF which can be controlled by the reservoir and spillway without the dam overtopping.

5. Datum: The principal (and emergency) spillway invert was arbitrarily assessed to be Elevation 1240, based on a review of USGS topography and MSHA field observations of the impounding embankment.

---

*Developed by the Corps of Engineers on a regional basis for Pennsylvania.

**Runoff estimated to occur as result occurrence of a PMP.

HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Predominately coarse and fine coal refuse deposits, unvegetated.

ELEVATION-TOP NORMAL POOL (STORAGE CAPACITY): 1240.0 (205 acre-feet)

ELEVATION-TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1243.0 (224 acre-feet)

ELEVATION-MAXIMUM DESIGN POOL: Unknown

ELEVATION-TOP DAM: Average = 1244.0, Minimum = 1243.0

OVERFLOW SECTION (Embankment Crest)

a. Elevation 1243.0 to 1244.9
b. Type Broad crested weir
c. Length 10 to 20 feet
d. Width 910 feet

OUTLET (Principal Spillway)

a. Type 18 inch Diameter CMP
b. Location Through Embankment
c. Entrance Invert 1240.0
d. Gate/Control None

HYDROMETEOROLOGICAL GAGES

a. Type None
b. Location N/A
c. Records None

MAXIMUM REPORTED NON-DAMAGING DISCHARGE None reported

HEC-1 DAM SAFETY VERSION
HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: Renton Slurry Pond 3	NDI NO. PA 00838
Probable Maximum Precipitation (PMP)	24.0*
Drainage Area	0.06 sq. mi.
Reduction of PMP Rainfall for Data Fit Reduce by 20%, therefore PMP rainfall	0.8 (24.0) =19.2 inches
Adjustments of PMF for Drainage Area (Zone 7)	
6 hrs.	102%
12 hrs.	120%
24 hrs.	130%
48 hrs.	140%
Snyder Unit Hydrograph Parameters	
Zone	24**
C_p	0.45
C_t	1.6
L	0.30 mile
L_{ca}	0.13 mile
$t_p = C_t (L \cdot L_{ca})^{0.3}$ =	0.60 hours
Loss Rates	
Initial Loss	1.0 inch
Constant Loss Rate	0.05 inch/hour
Base Flow Generation Parameters	
Flow at Start of Storm	1.5 cfs/sq.mi=0.09 cfs
Base Flow Cutoff	0.05 x Q peak
Recession Ratio	2.0
Principal (and Emergency) Spillway (Regulating Outlet)	
Diameter	18 inches
Type	CMP
Location	Through Embankment
Inlet Invert	1240.0
Gate/Control	None
Discharge Capacity	6 cfs

---

* Hydrometerological Report 33

**Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).

ACKENHEIL & ASSOCIATES
GEO Systems, Inc.
1000 Banksville Road
PITTSBURGH, PA. 15216
(412) 531-7111

Job RENTON SLURRY POND 3 Job No. 80138J

Subject DATA INPUT

Made By JDH Date 6/22/81 Checked JEB Date 6/23/81

LOSS RATE AND BASE FLOW PARAMETERS

STRTL = 1 inch

CNSTL = 0.05 inches/hour

STRTQ = 1.5 cfs/mi²

QRCSN = 0.05 (5% of Peak flow)

RTIOR = 2.0

ELEVATION - AREA - CAPACITY - RELATIONSHIPS

From USGS 7½ min quad, Penn Dot Files and Field inspection data.

AT elevation 1240.0

storage = 205 acre-ft area = 5.5 acres

AT ELEVATION 1260 area = 19.3 acres

From the Conic Method of Reservoir Volume.

Flood Hydrograph Package (HEC-1)

Dam Safety Version Users manual)

$$H = 3V/A = \frac{3(205)}{5.5} = 111.8$$

Elevation Were area equals zero

1240.0 - 111.8 = 1128.2

$A	0.0	5.5	19.3
$E	1128.2	1240.0	1260.0

ACKENHEIL & ASSOCIATES
GEO Systems, Inc.
1000 Banksville Road
PITTSBURGH, PA. 15216
(412) 531-7111

Job Renton Slurry Pond 3 Job No. 80138V
Subject DATA Input
Made By JPH Date 6/22/8/ Checked JEB Date 6/23/81

Overtop Parameters

Top of Dam Elevation (minimum)	1243.0
Length of Dam	910.
Coefficient of Discharge	3.09

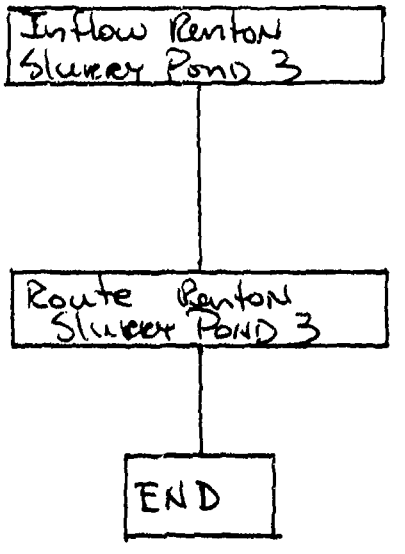
L_{max} 1030 feet V_{max} 1245.5

Principal (and Emergency) Spillway Stage-Discharge.

ANALYSIS taken from Design of Small Dams, USBR page 566
Figure B-9

Elevation (feet)	Discharge (cfs)
1240.0	0.0
1240.8	1.9
1241.5	5.5
1242.3	9.0
1243.0	11.0
1246.0	17.5

Program Schedule



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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  26 FEB 79
**********
    1              A1       NATIONAL PROGRAM FOR THE INSPECTION OF NON FEDERAL DAMS
    2              A2       HYDROLOGIC AND HYDRAULIC ANALYSIS OF RENTON REFUSE BANK POND 3
    3              A3       PROBABLE MAXIMUM FLOOD PMF/UNIT HYDROGRAPH BY SNYDER'S METHOD
    4              B   300       0      10       0       0       0       0       0      -4       0
    5              B1    5
    6              J     1       2       1
    7              J1   1.      .5
    8              K     0       1                                               1
    9              K1       INFLOW HYDROGRAPH FOR RENTON REFUSE BANK POND 3
   10              M     1     - 1     .06                .06                                    1
   11              P             24.0     102      120     130      140
   12              T                                                       1.0     .05
   13              W  0.60    0.45
   14              X  -1.5   -0.05     2.0
   15              K     1       2                                               1
   16              K1       ROUTING AT RENTON REFUSE BANK POND 3
   17              Y                                       1       1
   18              Y1    1                                                -1240.0      -1
   19              Y4 1240.  1240.8  1241.5  1247.3  1243.0   1246.
   20              Y5    0     1.9     5.5     9.0    11.0    17.5
   21              $A   0.     5.5    19.3
   22              $E1128.2  1240.0  1260.0
   23              $$1240.0  0.001    3.09     1.5
   24              $D1243.0   3.09     1.5    920.
   25              $L   10.    85.    490.    800.    950.   1030.
   26              $V 1243.  1243.5   1244.  1244.5   1245.  1245.5
   27              K     99
   28              A
   29              A
   30              A
   31              A
   32              A

                        PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                                RUNOFF HYDROGRAPH AT          1
                                ROUTE HYDROGRAPH TO           2
                                END OF NETWORK

**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  26 FEB 79
**********

RUN  DATE: 23 JUN 81
RUN  TIME: 12.40. 6

                        NATIONAL PROGRAM FOR THE INSPECTION OF NON FEDERAL DAMS
                        HYDROLOGIC AND HYDRAULIC ANALYSIS OF RENTON REFUSE BANK POND 3
                        PROBABLE MAXIMUM FLOOD PMF/UNIT HYDROGRAPH BY SNYDER'S METHOD

                                        JOB SPECIFICATION
                      NQ      NHR     NMIN     IDAY      IHR     IMIN    METRC     IPLT     IPRT    NSTAN
                     300        0       10        0        0        0        0        0       -4        0
                                        JOPER      NWT    LROPT    TRACE
                                            5        0        0        0

                                MULTI-PLAN ANALYSES TO BE PERFORMED
                                    NPLAN= 1 NRTIO= 2 LRTIO= 1
                            RTIOS=    1.00    0.50

          **********          **********          **********          **********          **********
```

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH FOR RENTON REFUSE BANK POND 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	0.06	0.0	0.06	0.0	0.0	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.0	24.00	102.00	120.00	130.00	140.00	0.0	0.0

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.0	0.0	1.00	0.0	0.0	1.00	1.00	0.05	0.0	0.0

UNIT HYDROGRAPH DATA

TP= 0.60 CP=0.45 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -0.05 RTIOR= 2.00

UNIT HYDROGRAPH 34 END-OF-PERIOD ORDINATES, LAG= 0.61 HOURS, CP= 0.45 VOL= 1.00

4.	13.	24.	28.	26.	22.	18.	15.	13.	11.
9.	8.	7.	6.	5.	4.	3.	3.	2.	2.
2.	1.	1.	1.	1.	1.	1.	1.	0.	0.
0.	0.	0.	0.						

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	26.88	24.46	2.42	5664.
										(683.)(	621.)(	61.)(	160.39)

****

HYDROGRAPH ROUTING

ROUTING AT RENTON REFUSE BANK POND 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.0	0.0	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.0	0.0	0.0	-1240.	-1

STAGE	1240.00	1240.80	1241.50	1247.30	1243.00	1246.00
FLOW	0.0	1.90	5.50	9.00	11.00	17.50
SURFACE AREA=	0.	6.	19.			
CAPACITY=	0.	205.	439.			
ELEVATION=	1128.	1240.	1260.			

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1240.0	0.0	3.1	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1243.0	3.1	1.5	920.

CREST LENGTH	10.	85.	490.	800.	950.	1030.
AT OR BELOW ELEVATION	1243.0	1243.5	1244.0	1244.5	1245.0	1245.5

PEAK OUTFLOW IS 218. AT TIME 40.33 HOURS
PEAK OUTFLOW IS 67. AT TIME 41.50 HOURS

****

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 1.00	 RATIO 2 0.50
HYDROGRAPH AT	1	0.06	1	225.	113.
	(	0.16)	(	6.38)(	3.19)(
ROUTED TO	2	0.06	1	218.	67.
	(	0.16)	(	6.16)(	1.88)(

SUMMARY OF DAM SAFETY ANALYSIS

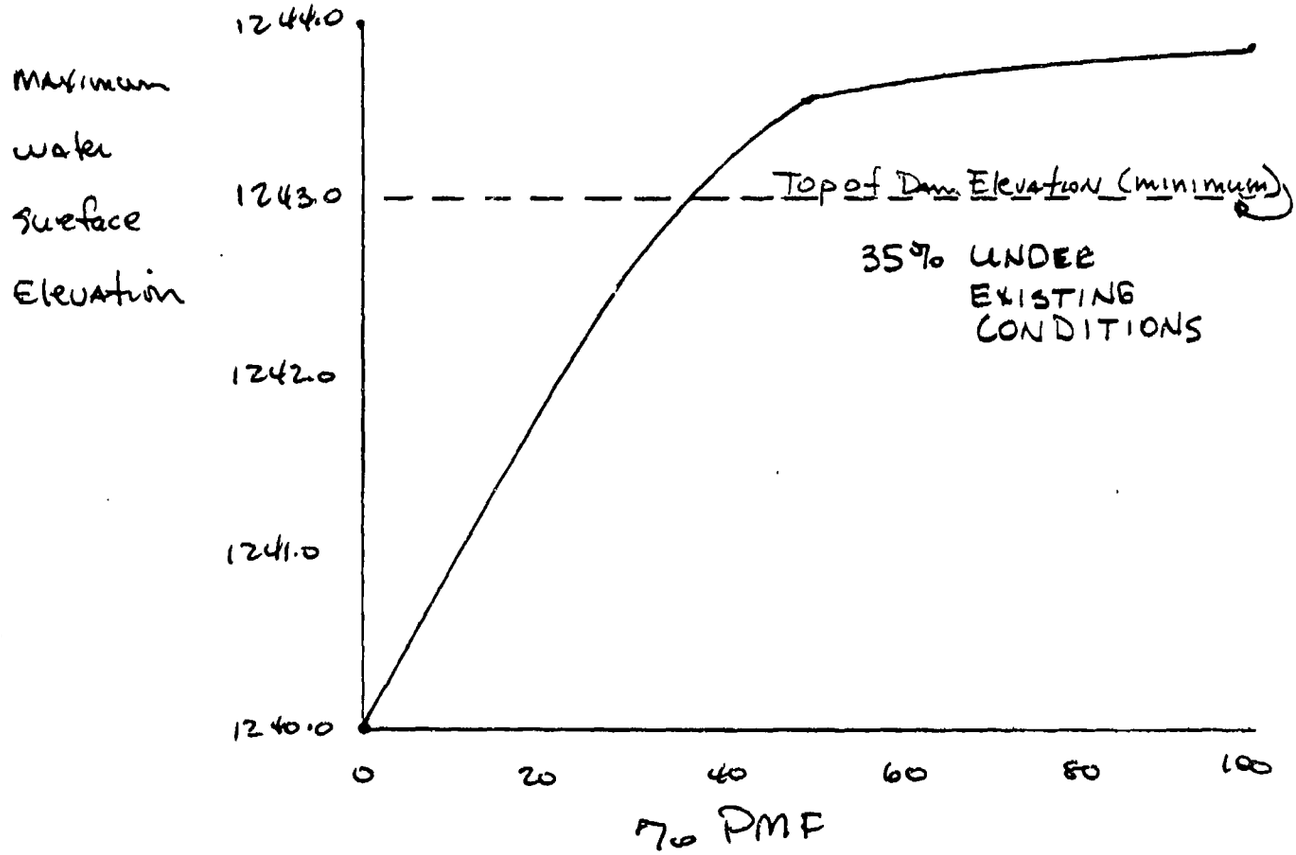
PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1240.00	1240.00	1243.00
STORAGE	205.	205.	224.
OUTFLOW	0.	0.	6.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1243.86	0.86	230.	218.	11.50	40.33	0.0
0.50	1243.58	0.58	228.	67.	8.67	41.50	0.0

ACKENHEIL & ASSOCIATES
GEO Systems, Inc.
1000 Banksville Road
PITTSBURGH, PA. 15216
(412) 531-7111

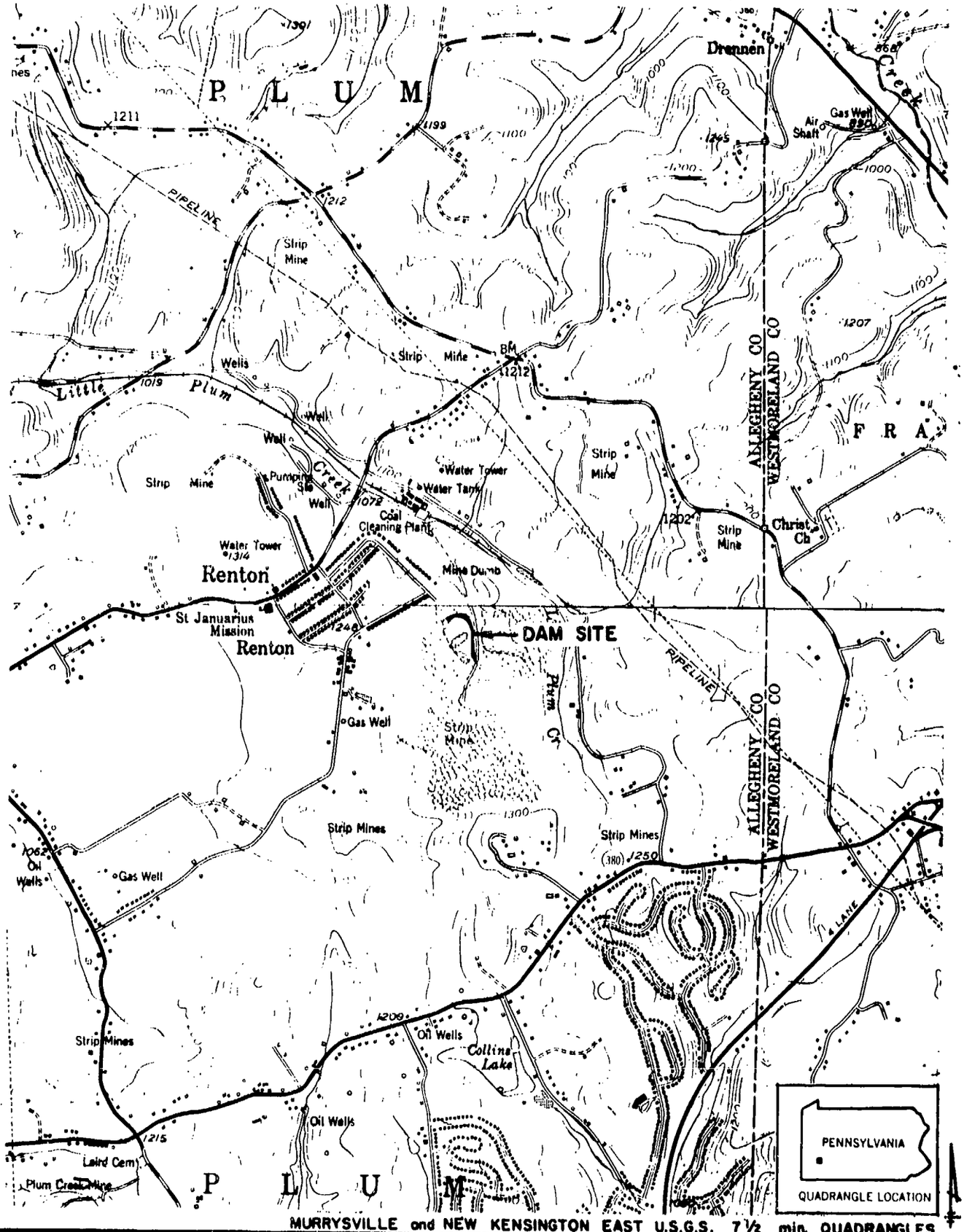
Job Penton Slurry Pond 3 Job No. 80138J
Subject Hydrologic Performance Plot
Made By JPH Date 6/22/81 Checked JB3 Date 6/23/81



APPENDIX E

PLATES

LIST OF PLATES



MURRYSVILLE and NEW KENSINGTON EAST U.S.G.S. 7½ min. QUADRANGLES

DATE: JULY 1981	RENTON SLURRY POND 3 NATIONAL DAM INSPECTION PROGRAM	REGIONAL VICINITY MAP
SCALE: 1"=2000'		
DR: JF CK:	ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS GEO SYSTEMS, INC. 1000 BANKSVILLE RD./PITTSBURGH, PA. 15216	
PLATE I		

APPENDIX F

GEOLOGY

GEOLOGY

Geomorphology

Renton Slurry Pond 3 is located within the Pittsburgh Plateau section of the Appalachian Physiographic Province. This area is characterized by gently folded sedimentary rocks which have been deeply incised by streams to form steep sided valleys. Pond 3 is located at the head of a small tributary feeding Little Plum Creek. Relief between the rounded hilltops adjacent to the site and valley bottom at Little Plum Creek is about 400 feet. Hilltops in this area reach elevations 1300 to 1400 feet.

Structure

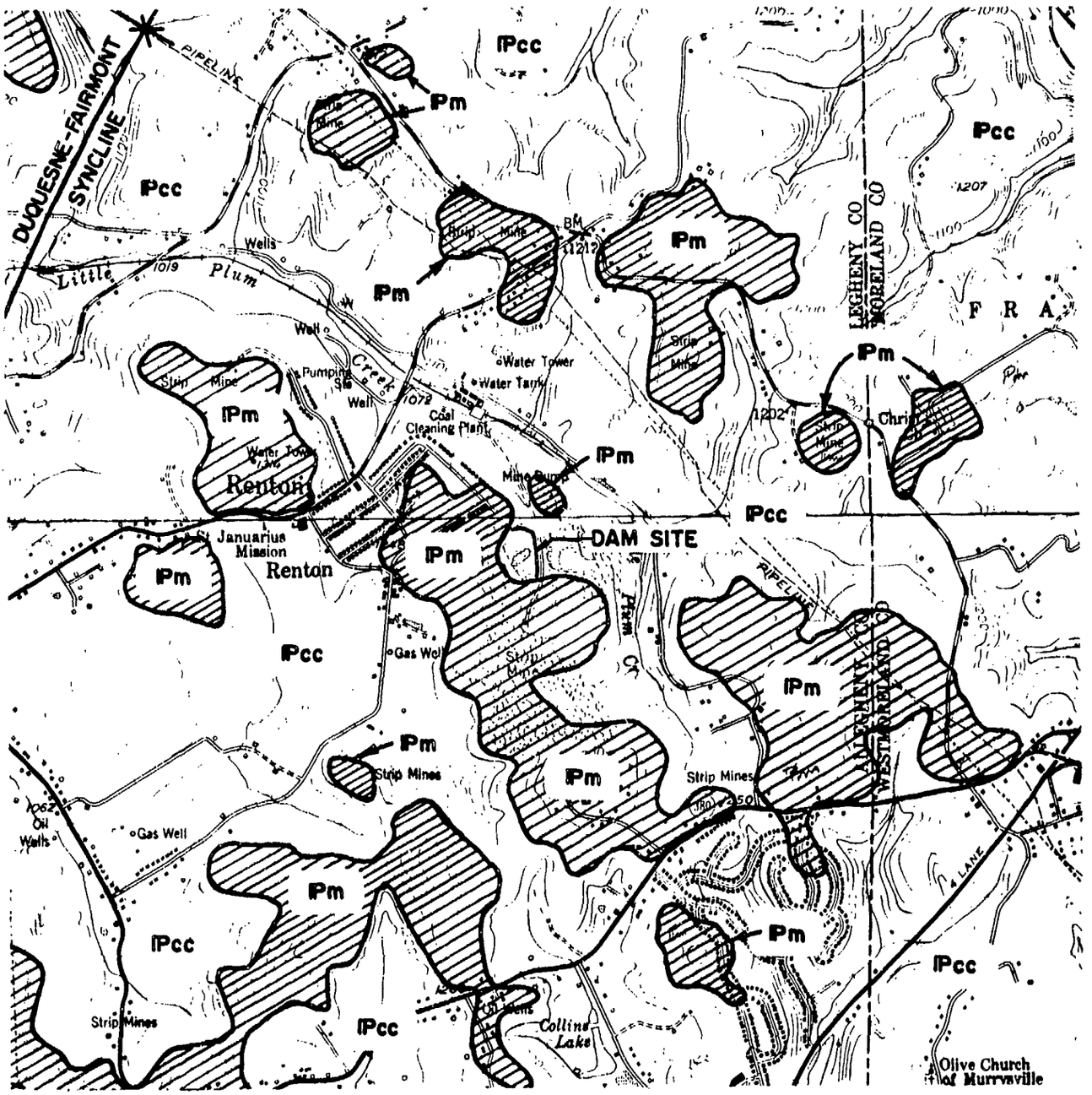
The axis of the Duquesne-Fairmont Syncline passes about 1.5 miles to the northwest of the site. This syncline trends northeast to southwest and plunges to the southwest. Rock strata at the site dip to the northwest at a rate less than 1 degree. No faults have been documented in the vicinity of the dam and no observations were made to indicate faulting in the rocks outcropping around the site.

Stratigraphy

Rocks outcropping in the area of the dam belong to the Casselman and Monongahela Formations which are of Pennsylvanian age. These formations consist of cyclic sequences of shale, sandstone, limestone, red beds and coal.

Mining Activity

The Pittsburgh Coal seam outcrops in the hillside adjacent to the pond and has been affected by strip mining and possibly deep mining. The Upper Freeport Coal, which lies about 640 feet beneath the site, may also have been affected by deep mining in this area.



MURRYSVILLE and NEW KENSINGTON EAST QUADRANGLES
ALLEGHENY COUNTY, PENNSYLVANIA

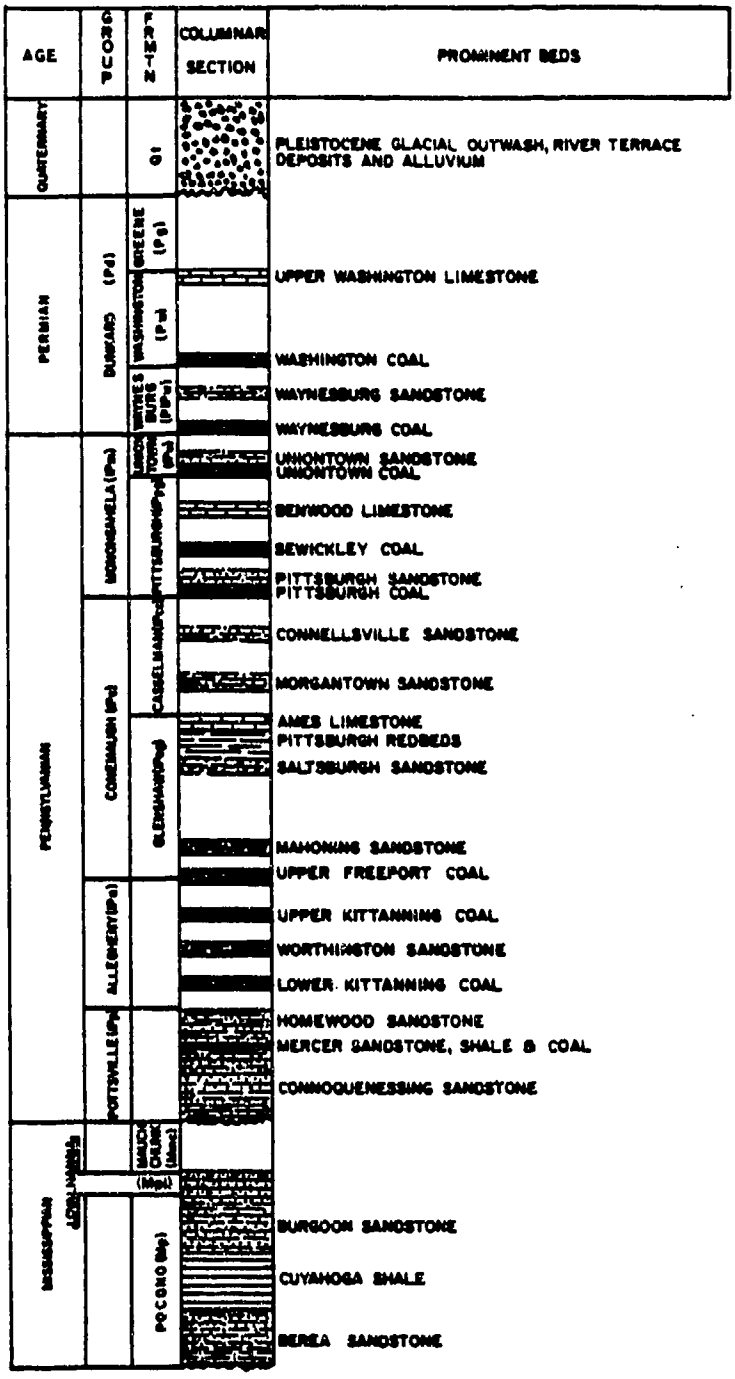
SCALE: 0 ½ MILE 1:24000

CONTOUR INTERVAL 20 FT. DATUM IS MEAN SEA LEVEL

——— FORMATION CONTACT

DATA OBTAINED FROM PENNSYLVANIA TOPOGRAPHIC AND GEOLOGIC SURVEY GREATER PITTSBURGH REGION GEOLOGIC MAP AND CROSS SECTIONS,1975 and GREATER PITTSBURGH REGION STRUCTURE CONTOUR MAP,1975

DATE: JULY 1981	RENTON SLURRY POND 3 NATIONAL DAM INSPECTION PROGRAM	GEOLOGIC MAP
SCALE: 1"=2000'		
DR: JF CK:	ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS GEO SYSTEMS, INC. 1000 BANKSVILLE RD./PITTSBURGH, PA. 15216	



DATE: JULY 1981	RENTON SLURRY POND 3	GEOLOGIC COLUMN
SCALE: 1"=360'	NATIONAL DAM INSPECTION PROGRAM	
DR: JF CK:	ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS	
	GEO SYSTEMS, INC.	
	1000 BANKSVILLE RD./PITTSBURGH, PA 15216	